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NOTES ON NEW ENGLAND VIOLETS,— II.

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It would seem that after careful scrutiny of their claims two boreal species must be added to the list of New England violets. One is *Viola Novae-Angliae*, published by Mr. House in a recent number of RHODORA.¹ It is surely a good species, and was believed to be so by others before Mr. House pointed out its claims to recognition. Mr. Fernald, who collected the type specimens, wrote on sending duplicates to me with other material last February: "One, Mr. Pollard has called *V. emarginata*, but I can't believe that the little plant of Fort Kent and St. Francis (my nos. 2244, 2245) has much to do with the southern species. I have always been confident from the habitat of the plant and the high-northern species with which it grows, that it represented a thoroughly distinct species. I shall endeavor to get more and better material this year. I shall be glad to have you describe the plant, if you, too, feel that it is quite distinct."

Though recognizing its distinctness, I deemed it prudent to wait for summer specimens showing the mature leaves and fruit. During my brief study of the genus I had become painfully aware of the confusion that had arisen from the publication of scores of obscure and illegitimate species, based on scanty or immature material; and I felt that no one ought to create a species in this group before seeing the plant in its mature stages of growth. Accordingly Mr. Fernald went to the trouble and expense of a journey to St. Francis last July, secured midsummer specimens, and had the live plant reproduced in a water-color that beautifully exhibits the capsules of both petaliferous and cleistogamous flowers.

Meanwhile Mr. House, in entire ignorance of this investigation,

¹ RHODORA, vi. 226, pl. 59 (1904).

has described and figured the species from flowering specimens formerly sent to Mr. Pollard. Under the circumstances I am sure there will be no discourtesy, if from the new material in my possession I supplement his description, and point out some of the errors into which he has fallen from not knowing the mature fruit of this and of some of the other specimens cited.

With these data in hand it is not "difficult to decide the systematic position of this species." It is a very close ally of *V. septentrionalis*. In fact, I find only two evident characters by which it can be distinguished from that species,—the narrowness of the leaf and the absence of ciliation in the sepals. The two species are alike in pubescence, in the color of the petals, in the bearded spurred petal, in having sagittate cleistogamous flowers on short declined peduncles, and in the size, color and shape of the capsules. In midsummer the leaf and the capsule of *V. Novae-Angliae* naturally attain to a greater development than is indicated in Mr. House's dimensions, and the leaf loses the thinness of texture of which he speaks.

In addition to the type specimens from Fort Kent, Mr. House has cited as referable to this species specimens from four other stations. The St. Francis plant is unquestionably the same, growing along the same river fifteen miles farther up. But the plant from Orono, Maine (no. 2256 Fernald) is surely to be otherwise disposed of; as Mr. House would have doubtless himself admitted, had he seen the plants collected from the same station the following September. Oddly enough, this is one of the plants cited by me in RHODORA (vi. 216) as *V. septentrionalis* × *fimbriatula*, growing with the parent forms. Not only are the leaves of this much wider than in *V. Novae-Angliae* and the sepals ciliate; but also some of the cleistogamous capsules are quite green as in *V. fimbriatula*, and all more or less sterile. In fact, the Orono specimens are quite like Mr. Mathews's excellent drawing of this hybrid.¹ (RHODORA, Plate 58, fig. a.)

¹ The above comment was based upon specimens of Mr. Fernald's no. 2256 in the Gray Herbarium. Since, I have been able through the courtesy of Dr. Rose to examine the sheet of this seen by Mr. House in the National Herbarium. It is interesting to note that two of the four plants there shown are the above named hybrid; but closely intermingled with them are two plants of *V. septentrionalis*, one of the parent forms. It may be readily distinguished from the hybrid by the broader leaf, scantier pubescence, and the notably less conspicuous stipules.

The plant from Bridgeport, Connecticut, is also in my judgment incorrectly referred to *V. Novae-Angliae*. The fact that the two stations are at the opposite ends of New England, 500 miles apart, is suspicious. But the leaves of Dr. Eames's plant are much wider and less cordate at the base than Mr. Fernald's; the sepals are narrowly lanceolate, some of them ciliate and with long hispidulous auricles, betraying, to my mind, traits inherited both from *V. cucullata* and from *V. fimbriatula*. In short, the plant is the same, so far as the characters are developed in the vernal stage, as those that I have regarded (RHODORA, vi. 217, 218) as resulting from a cross between these two species. The hybrid proves to be not uncommon in southern Connecticut, as I have received it recently from three stations other than those cited in RHODORA.

The remaining plant referred to *V. Novae-Angliae* by Mr. House was collected by Mr. Pollard on the Blue Hill Reservation near Boston. In leaf-outline these specimens have a closer resemblance to the Fort Kent plant than have those from either Bridgeport or Orono; but in fact they are only small seedlings of *V. fimbriatula*. Two of these young plants at the date of collection, Aug. 24, had already produced cleistogamous flowers, but the two green capsules shown are borne on erect peduncles 6–7 cm. long, not on "short horizontal" ones, "1.5–2.5 cm. long," as in *V. Novae-Angliae*. The slender sepals, the long somewhat hispidulous auricles, the denser pubescence, the relatively shorter leaf-blades, the more obscure crenation, all point to *V. fimbriatula*.

The new species, then, seems to be known only from the two stations along the River St. John, on the northern boundary of Maine. Judging from its associations and its affinity to *V. septentrionalis*, it is more likely to be found hereafter northward or eastward, in Quebec or in New Brunswick, than southward in New England as a whole. The name *V. Novae-Angliae*, consequently, turns out to be somewhat unfortunate.

The other new species of *Viola* for northern New England is more widely distributed. It has been found at four stations in Maine and four in Vermont,—in mossy bogs, along streams in silt or gravel, or in the wet debris of cliffs. It is ordinarily a small plant, in its vernal state not easily distinguished from *V. affinis*; but later it develops leaves that are broader than in that species, less conspicuously crenate, and cleistogamous fruit that is green instead of purple. In

these respects it approaches *V. cucullata*,— so much so that on my first acquaintance with the plant in August, 1903, I queried if it might not be a hybrid between this and *V. affinis* which were growing with it. However, the violet color of the petals, the obtuse sepals, the constant green of the capsules and the absence of all indications of sterility convinced me during the past season that the plant was a valid species, answering well to the description of *V. vagula*, Greene (Pitt. iv. 67). As no type of this species was extant, one of the chief objects of a visit to Ottawa last September was to observe this plant in the original station. Under the courteous guidance of Dr. James Fletcher this was accomplished. The station is a flat, boggy "beaver-meadow" across the Ottawa River in Hull, Quebec, and the plant has proved to be identical with those from Vermont and Maine.

But the species is found to extend across the Dominion of Canada from Eastern Quebec at least to the Rocky Mountains. Mr. Fernald collected it the past summer at seven stations along various rivers of the Gaspé Peninsula. Mr. A. B. Klugh has sent it to me from near Guelph in western Ontario. In the Gray Herbarium there are specimens from Saskatchewan and from Assiniboia; and in the National Herbarium a fine sheet from Banff, Alberta, showing the plant both in petaliferous flower and in its late summer stages with characteristic leaves and fruit. Furthermore, the species is found to extend southward in the Rocky Mountain region at least into Colorado. The large herbaria at Washington, New York and Cambridge show that the plant is common in all the mountainous States of the northwest, the specimens collected of late years passing usually under the name of *V. cognata*, Greene, or *V. nephrophylla*, Greene.

Through the great kindness of Professor Greene the type specimens of these two species have been sent me for study. They were collected by Professor Greene himself in the summer of 1896,— *V. nephrophylla* at Cimarron River in western Colorado, and *V. cognata* at Dale Creek, about 200 miles to the northeast, on the southern borders of Wyoming. The latter was in the advanced stages of petaliferous flowering, the thirteen plants preserved showing eight cleistogamous ovoid flowers on slender ascending or horizontal peduncles 2-4 cm. long. The petals are all more or less hairy; the sepals ovate or oblong, obtuse; the later leaves, cordate, obtuse, obscurely crenate, glabrous. In all these characters the plants closely resemble the eastern specimens collected at that stage of growth.

The type of *V. nephrophylla* consists of fourteen plants collected two months later, August 29. They display numerous cleistogamous capsules in various stages of growth, the mature ones being oblong, green, 6–8 mm. long, bearing oblong obtuse sepals half the length of the capsule. Several of the plants also bear on peduncles (2–4 cm. long) reduced petaliferous flowers, which cannot be regarded as a remnant of the vernal crop, but as an occasional autumnal development, not rarely observed in other species of violets. Indeed, Dr. Fletcher and myself found two such flowers with half-developed petals at the type station of *V. vagula*, September 3d. The leaves of *V. nephrophylla* are broadly cordate, obtuse or with a short blunt apex, obscurely crenate, glabrous (save a few minute stiff hairs on the upper surface of some of the basal lobes), 2–5 cm. wide, except that in one large plant the width of 6.8 cm. is attained. In all these particulars the eastern plants under discussion in their autumnal stage are an excellent match for *V. nephrophylla*. In spite of a marked difference in aspect of these two western types, I am forced to regard them as representing only one species, collected first in its vernal state, and afterward in its late summer development.

It should not surprise us to find a northern species of *Viola* extending through such a wide range of longitude. There are a hundred or more boreal species occurring in the northern Rocky Mountains, and also in northern New England or in eastern Canada; and fresh researches are yearly adding to the list.¹ Among these additions it is interesting to find this distinct violet, of which I venture to set forth the following description:

VIOLA NEPHROPHYLLA, Greene. Glabrous, but under a lense often disclosing minute stiff white hairs on the upper surface of æstival leaves, and occasionally on petioles and veins beneath; earliest leaves orbicular or slightly reniform, later leaves cordate-deltoid or broadly cordate, obtuse, obscurely crenate-serrate, 3–6 cm. wide; flowers violet, on peduncles exceeding the leaves, spurred petals

¹As illustrating the points of identity in these two floras, I would cite on Mr. Fernald's authority: *Anemone parviflora*, *A. multifida*, *Thalictrum alpinum*, *Ranunculus Macounii*, *R. Purshii*, *Astragalus elegans*, *A. frigidus*, var. *Americanus*, *Dryas Drummondii*, *Parnassia parviflora*, *Epilobium latifolium*, *Lonicera involucrata*, as characteristic plants of the river-valleys where *V. nephrophylla* abounds in Eastern Quebec. In one section alone of *Carex* (*Hyparrhenae*) I count twenty-one species common to the two regions in which *V. nephrophylla* is found.

somewhat bearded, the lateral densely bearded, and often the two upper with scattered hairs; sepals ovate to lanceolate, obtuse or often rounded; cleistogamous flowers on short and recurved or prostrate peduncles, ovoid, producing green oblong capsules 5–8 mm. long.—Pitt. iii. 144; *V. cognata*, Greene, Pitt. iii. 145; *V. vagula*, Greene, Pitt. iv. 67. — The eastern stations from which the species has been seen are the following: QUEBEC; Hull, 1898, *J. M. Macoun*; Gaspé Co., banks and gravel beaches of Grand and Dartmouth Rivers; Bonaventure Co., along the Restigouche, Escuminac, Bonaventure and Little Cascapedia Rivers, June 28–Aug. 27, 1904. *M. L. Fernald*. MAINE: Fort Fairfield, river-beach, June 5, 1901; Masardis, abundant on ledgy river-bank, Sept. 8, 1897; Blaine, arbovitae swamps, in sphagnum, June 23, 1898, no. 2255, and June 7, 1901; Winslow, rocky shore of Kennebec River, Sept. 2, no. 2626, & wet calcareous cliffs, Sept. 3, 1898, no. 2612, *M. L. Fernald*. VERMONT: wet slides of Willoughby Mt., June 2, 1892, July 18, 1896, & May 26, 1901, *G. G. Kennedy*; May 27, 1903, *W. W. Eggleston*; Aug. 30, 1904, *Annie Lorenz*¹; New Haven, shady border of bog, Aug. 14, 1903, & May 18, 1904; Middlebury, river-border under alders, 1904; Manchester, wet mossy meadow and in moist loam along a brook, Sept. 26, 1904, *Ezra Brainerd*. ONTARIO: Wellington Co., open springy ground near Puslinch Lake, May 15, & 17, 1904, *A. B. Klugh*.

There are indications that in southwestern New England we may have two more species, hitherto recorded only from the Middle States. Dr. E. H. Eames has collected in the vicinity of Bridgeport, Connecticut specimens that Mr. Pollard has pronounced to be *V. villosa*, Walt; and Profr. Greene asserts (Pitt. iii. 313) that *V. emarginata* "is known to me as occurring as far northeastward as the vicinity of New York City." The latter species is, indeed, too vaguely apprehended. The specimens under covers so labeled are in many herbaria a medley of odd things, from such a plant as *V. Novae-Angliae* to others with broad deeply lobed leaves, as figured by Mr. W. Stone (Proc. Acad. Nat. Sci. Phila. 1903, Pl. 36. v.). But aside from these aberrant forms, that require prolonged and critical study of the living plant, it may be presumed that there is a "typical" *V. emarginata*, such as is figured in the Britton Illustrated Flora (iii. 520).

In view of these additions and the clearer knowledge that has come from another season's field work, I desire to present the following revised synopsis of our blue stemless non-stoloniferous

¹ These plants, through an error of mine, were called *V. venustula* in Dr. Kennedy's Flora of Willoughby (RHODORA, vi. 123).

violets. *V. pedata* is in a class by itself, having no bearded petals and no known cleistogamous flowers. The other species I would arrange according to their natural affinities as follows:—

KEY TO THE BLUE ACAULESCENT VIOLETS OF THE NORTHEASTERN UNITED STATES.

- I. Peduncles of cleistogamous flowers decumbent or declining.
- A. Cleistogamous flowers ovoid or ovoid-acuminate; auricles of sepals short, appressed.
- a. Leaves cordate, glabrous, 2–6 cm. wide; petals violet, spurred petal somewhat bearded; cleistogamous capsules usually growing above ground, subglobose or oblong, 5–8 mm. long; sepals half the length of capsule.
- * Aestival leaves not acuminate, obscurely crenate; cleistogamous capsules green, bearing broadly ovate to lanceolate usually obtuse often rounded sepals. (1) *V. NEPHROPHYLLA*, Greene.
- * * Aestival leaves acuminate, conspicuously crenate-serrate; cleistogamous capsules purple, bearing lanceolate attenuate sepals. (2) *V. AFFINIS*, LeConte.
- b. Leaves broadly cordate, or lobed in (6), 4–12 cm. wide; spurred petal almost or quite beardless except in (3); cleistogamous capsules often underground until mature, oblong, 8–15 mm. long; sepals ovate-lanceolate, one-quarter to one-third the length of capsule.
- * Plants nearly or quite glabrous; petals violet; cleistogamous capsules usually pale green.
- † Vernal leaves purple beneath; aestival leaves often broadly deltoid or with concave edges toward the apex. (3) *V. LATIUSCULA*, Greene.
- †† Vernal leaves green beneath; aestival leaves rounded above the base or the apex but slightly produced. (4) *V. PAPILIONACEA*, Pursh.
- * * Plants more or less villous-pubescent; petals commonly light blue or lavender; cleistogamous capsules usually purple.
- † Leaves never lobed. (5) *V. SORORIA*, Willd.
- †† Leaves more or less lobed. (6) *V. PALMATA*, L.
- * * * Upper surface of leaves hispid-pubescent; petals reddish purple. (7) *V. VILLOSA*, Walter.
- B. Cleistogamous flowers sagittate, producing short-obovate or subglobose usually purple capsules 4–7 mm. long; auricles in fruit long, spreading; petioles veins and margins of leaves hirsutulous; petals violet, spurred petal bearded.
- a. Leaves cordate, 4–7 cm. wide; sepals and their auricles ciliolate. (8) *V. SEPTENTRIONALIS*, Greene.
- b. Leaves narrowly cordate-deltoid, 2–3.5 cm. wide; sepals and auricles not ciliolate. (9) *V. NOVAE-ANGLIAE*, House.
- II. Peduncles of cleistogamous flowers erect; their capsules oblong, green, bearing lanceolate to narrowly lanceolate long-auricled sepals.
- A. Spurred petal bearded; cleistogamous flowers sagittate.
- a. Leaves pubescent, ovate-oblong, often coarsely toothed at base; petals purple. (10) *V. FIMBRIATULA*, J. E. Sm.
- b. Leaves nearly glabrous, lanceolate, basal lobes prominently toothed or incised; petals purple or violet. (11) *V. SAGITTATA*, Ait.
- c. Leaves nearly glabrous, deltoid, basal lobes finely toothed or incised; petals blue. (12) *V. EMARGINATA*, LeConte.
- d. Leaves nearly glabrous, deeply lobed or parted.

* Leaves truncate at base or subcordate, slightly decurrent, middle lobe usually the widest, segments 7-9; petals violet.

(13) *V. SEPTEMLOBA*, LeConte.

* * Leaves decurrent on petiole, flabellately veined at base, segments of nearly equal width, 9-15; petals blue.

(14) *V. PEDATIFIDA*, Don.

B. Spurred petal beardless; cleistogamous flowers subulate; leaves cordate, glabrous; petals pale blue, darker towards the throat.

(15) *V. CUCULLATA*, Ait.

MIDDLEBURY COLLEGE.

A PECULIAR VARIETY OF *DROSERA ROTUNDIFOLIA*.

M. L. FERNALD.

IN August, 1904, the marly sphagnous bogs at the mouth of the Grand River, Gaspé County, Quebec, were found by Messrs. J. F. Collins, A. S. Pease, and the writer to be the home of many remarkable plants, among others three *Droseras* which are little known to American botanists. One of the bogs had its open marly spots almost given over to four plants, *Drosera linearis*, Goldie, *D. longifolia*, L. (*D. anglica*, Hudson), *Juncus stygius*, var. *americanus*, Buchenau, and *Pinguicula vulgaris*, L., though other species, there less abundant, were quite at home in the calcic carbonate.¹ On the mossy knolls at the borders of the open marl normal *Drosera rotundifolia* was abundant.

Soon after the exploration of this bog, another, perhaps a mile distant, was visited. On entering the bog a tiny inflorescence was noticed, so strange in appearance that at first sight it was taken to be the unique *Saxifraga stellaris*, var. *comosa* of Mt. Katahdin. Instead, however, the plant proved to be a peculiar dwarf variety of *Drosera rotundifolia* with subcapitate inflorescences of few flowers, the petals colored, and the ovary instead of producing normal capsules, tending to develop into a rosette of glandular foliage-leaves. This tendency was also noted in other floral organs, but it was most apparent in the carpels.

Examination of the bog showed that the anomalous *Drosera* was abundant in the wet portion between the central pond and the higher

¹ An analysis of soil from a similar bog in Aroostook Co., Maine, shows it to contain nearly 96 % of calcic carbonate.